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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/727,058	12/03/2003	Yaw S. Obeng	SILO-0011D1	5013

27964 7590 12/28/2004

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EXAMINER

THOMAS, DAVID B

ART UNIT PAPER NUMBER

3723

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/727,058

Applicant(s)

OBENG, YAW S.

Examiner

David B. Thomas

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3 and 10 are rejected under 35 U.S.C. 102(b) as being anticipated by Fisher, Jr. et al. (6,186,864 and 6,045,434).

Fisher, Jr. et al. ('864 and '434) disclose a system for measuring surface properties of a polishing pad, the system having a polishing pad; an ultrasonic probe located over the polishing surface and configured to both transmit an ultrasonic signal to the polishing surface and receive a modified signal from the polishing surface without contacting the polishing surface, wherein the modified ultrasonic signal is a reflected signal. That signal may be used to calculate a reflectance spectrum of the polishing surface. A subsystem is coupled to the ultrasonic probe for determining a surface property of the polishing pad from the reflected signal. The ultrasonic probe may comprise a single ultrasonic transducer, or a first and second transducer, one for transmitting, one for receiving, and the surface property that is measured is surface texture (i.e. changes in the thickness of the pad).

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3. Claims 1-3, and 10 are rejected under 35 U.S.C. 102(e) as being anticipated by Elledge (2004/0043521 A1).

Among other features, Elledge discloses that while the CMP process is being performed (i.e., in-situ), ultrasonic source 130 transmits ultrasonic signals onto the surface of polishing pad 104 at step 208. In other embodiments, ultrasonic source 130 transmits ultrasonic signals onto the surface of polishing pad 104 after substrate 114 is polished (e.g., ex-situ). Some transmitted ultrasonic signals may be reflected from polishing pad 104, while others may propagate through polishing pad 104 and be subsequently reflected from platen 102. Ultrasonic detector 132 receives reflected ultrasonic signals at step 210. At step 212, the reflected ultrasonic signals are amplified by ultrasonic amplifier 122. The amplified signals are then transmitted to computer processor 124. As computer processor 124 receives real-time reflected and amplified ultrasonic signals, computer processor 124 monitors the properties of polishing pad 104 at step 214. At substep 216, processor 124 determines real-time pad properties based at least in part on the reflected and amplified ultrasonic signals. For example, in response to receiving ultrasonic signals reflected from polishing pad 104 and ultrasonic signals reflected from platen 102, processor 124 may calculate the thickness of polishing pad 104. As shown in FIGS. 3-10, processor 124 may generate ultrasonic images and various graphs based at least in part on the collected ultrasonic signals. As shown in FIGS. 3-10, ultrasonic probe assembly 120 preferably has the capability of resolving at least micron-sized polishing pad features, thus allowing processor 124 to measure pad properties, such as pad roughness (or texture), pad groove depth, and

other physical pad properties (see pp 0045-0047).

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elledge (2004/0043521 A1), as applied to claims 1-3, and 10 above.

Elledge (2004/0043521 A1) discloses the system for measuring surface properties of a polishing pad, as claimed, except for specifying a particular range for either the frequency of the ultrasonic signal or the air gap between the probe and the polishing surface. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have experimented with various frequencies and heights above the polishing surface, without undue burden, to arrive at optimum values for each parameter, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

6. Claims 6-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elledge (2004/0043521 A1), as applied to claims 1-3 and 10 above, in view of Ono et al (2004/0055223 A1).

Elledge (2004/0043521 A1) discloses the claimed invention except for a polishing pad having the specific characteristics as presently claimed. Elledge (2004/0043521 A1), however, teaches that the Polishing pad 104 may be a conventional polishing pad made from a relatively soft, thin, and porous material, such as polyurethane. Polishing

pad 104 may also be an abrasive polishing pad with abrasive particles fixedly bonded to a suspension medium. CMP apparatus 100 may also have an underpad 109 attached to the surface of platen 102 for supporting polishing pad 104 (paragraph [0032]). Ono et al. (2004/0055223 A1) teach the manufacture of polishing pads that have the characteristics of the polishing pad as presently claimed. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the system of Elledge (2004/0043521 A1) by providing a particular polishing pad to the system, such as suggested by Ono et al. (2004/0055223 A1), wherein the choice of a particular polishing pad would have been obvious based upon the effect that a particular polishing pad has on a particular substrate to be polished, e.g. semiconductor wafers containing aluminum, copper, tantalum, etc. each of which having particular polishing characteristics.

Response to Arguments

7. Applicant's arguments filed September 29, 2004 have been fully considered but they are not persuasive.

8. In response to applicant's argument that neither Fisher et al. nor Elledge disclose each and every element of the claimed invention, or teach or suggest calculating a reflectance spectrum, the examiner respectfully disagrees. Regarding the issue of calculating a reflectance spectrum, the examiner notes that claim 1 neither positively recite this limitation nor distinctly defines a reflectance spectrum (see line 7, which recites, "a reflected signal *used to calculate* a reflectance spectrum" [emphasis added]) but merely introduces this feature as an implied, or intended use of the reflected signal,

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and as such, a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. Fisher et al. and Elledge each transmit an ultrasonic signal and receive a modified ultrasonic signal, and using a "subsystem", i.e. a signal analyzer or process controller, calculates or determines a surface property of the polishing pad, therefore, the examiner respectfully contends that the system of either Fisher et al. or Elledge are capable of performing the intended use. In a claim drawn to a process of making, the intended use must result in a manipulative difference as compared to the prior art. See *In re Casey*, 152 USPQ 235 (CCPA 1967) and *In re Otto*, 136 USPQ 458, 459 (CCPA 1963).

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Meloni (6,264,532) discloses an apparatus for use with a chemical mechanical planarization system that includes an ultrasonic source that is disposed proximate a workpiece carrier. The invention provides a device to detect the breakage or loss of a workpiece by generating an ultrasonic signal and directing the ultrasonic signal at an area on the surface of a polishing pad or workpiece, and analyzing the reflection of the ultrasonic signal to obtain real-time detection of the loss or breakage of a workpiece. In accordance with an exemplary embodiment of the present invention, an ultrasonic sensor assembly is mounted to a CMP machine. The ultrasonic assembly comprises an ultrasonic source and an ultrasonic detector. The

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ultrasonic source is configured to generate and direct an incident ultrasonic signal at an area on the surface of the polishing pad or workpiece as the workpiece is being polished. The incident ultrasonic signal is absorbed, scattered, and reflected to produce a reflected beam. The ultrasonic detector is configured to receive the reflected beam, and the reflected beam is then processed by a processor to detect the breakage or loss of the workpiece.

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David B. Thomas whose telephone number is (571) 272-4497. The examiner can normally be reached on 7-4 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph J. Hail can be reached on (571) 272-4485. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


dbt


David B. Thomas
Primary Examiner
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